

the Hellbender

by Tom R. Johnson and Jeff Briggler, Herpetologists

A unique and ancient species of aquatic salamander in great need of help to survive in our Ozark streams



Jim Rathert

What is a Hellbender?

Hellbenders, the largest salamander in North America, are considered by some to be rather ugly. Although they may look strange, hellbenders are harmless aquatic creatures that are an important part of the Ozark stream ecosystem. In Missouri, Arkansas and throughout their geographic range, hellbenders are suffering from an alarming population decline and need help if they are to survive.

Hellbenders are classified as amphibians, a group of animals that includes toads and frogs. Adults range in length from 11 to more than 20 inches. The record length is 29 inches. Hellbenders have a wide, flat head with tiny eyes and a broad and vertically compressed tail. Their body and legs are covered with prominent folds of skin. Coloration is a combination of browns or grayish-browns with a varying number and size of dark blotches and a yellowish-brown belly. During the breeding season in late summer and early autumn, hellbenders may have an overall reddish-brown color.

The hellbenders in North America are the eastern hellbender (*Cryptobranchus alleganiensis alleganiensis*) and the Ozark hellbender (*Cryptobranchus alleganiensis bishopi*). The eastern hellbender ranges from southern New York state south to northern Georgia and west to Missouri. The Ozark hellbender, a subspecies or geographic race of the eastern hellbender, is found only in south central Missouri and in a few rivers in extreme north central Arkansas. Missouri is the only state that has both types of hellbenders. The closest living relative of hellbenders lives across the Pacific Ocean in mountain streams of Japan and southeastern China. Called giant salamanders, these true giants of the amphibian world can reach a length of nearly 5 feet and weigh more than 100 pounds.

What's the origin of the name "hellbender"?

The name "hellbender" probably comes from the animal's odd look. Perhaps it was named by settlers who thought "it was a creature from hell where it's bent on returning." Another rendition says the undulating skin of a hellbender reminded observers of "horrible tortures of the infernal regions." In reality, it's a harmless aquatic salamander.

Biology

Hellbenders live in cool, clear streams with moderate to fast current. Hellbenders are fully aquatic, which means they cannot live out of water and do not try to crawl out of their stream or river habitat. As river water flows over their body, oxygen is taken up by tiny blood vessels in the skin and carbon dioxide is released. Adult hellbenders do not have gills like fish. Their lungs are small and used primarily for buoyancy. To “breathe,” they use their extremely wrinkled skin to absorb dissolved oxygen from the water.

Hellbender life stages:

1. Eggs are usually laid in a long strand—similar to a string of beads—in a cluster under a large, flat rock or in an opening in bedrock.
2. Close-up of a hellbender egg with embryo.
3. Newly hatched hellbender larvae with a yolk sack, external gills and rudimentary limbs.
4. A juvenile hellbender. External gills are beginning to recede.

1-3: Tom R. Johnson photos; 4: Jim Rathert

Hellbenders have a rudder-like tail, but they seldom swim. Instead they walk slowly along the stream bottom. Most of their time is spent hiding under large, flat rocks on the river bottom. They may spend days under the same flat rock, coming out at night to search for food. Hellbenders are known to eat a variety of aquatic prey, such as small fish and aquatic insects, but around 90 percent of their diet consists of crayfish.

Because of their nocturnal and secretive behavior, these salamanders are seldom observed by a casual visitor to Ozark streams. There are people who have spent their entire life in the Ozarks and have never seen a hellbender.

Courtship and breeding take place in late summer and early autumn. This is when hellbenders increase their activity and may be seen walking on the bottom. Females may not be of breeding age until they are 7 to 8 years of age, whereas males can breed at a slightly younger age. Hellbender eggs are fertilized externally, which is the same process fish use. A male spreads a cloud of sperm over a newly laid clutch of eggs from a female he has courted. From 200 to more than 700 eggs may be produced by each female. Research of hellbender reproduction has shown that female hellbenders may breed



only every second or third year. Eggs are usually laid in a long strand—similar to a string of beads—in a cluster under a large, flat rock or in an opening in bedrock. The eggs are normally guarded by a male and take from 4 to 6 weeks to hatch.

Newly hatched hellbender larvae are less than 1 inch in total length and have a large, yellow yolk sack, external gills and rudimentary limbs. The yolk sack may last for several months as the larvae develop. Once the tiny hellbenders begin to eat

small aquatic invertebrates, the larvae turn a dark brown or nearly black color. In about two years hellbender larvae lose their gills and are from 4 to 5 inches in length. Little is known about the life of young hellbenders, but it is assumed they spend most of their time in stream gravel where they find food and hiding niches. Studies have shown that under natural river conditions hellbenders typically live 30 to 35 years; however, one specimen reached age 55.

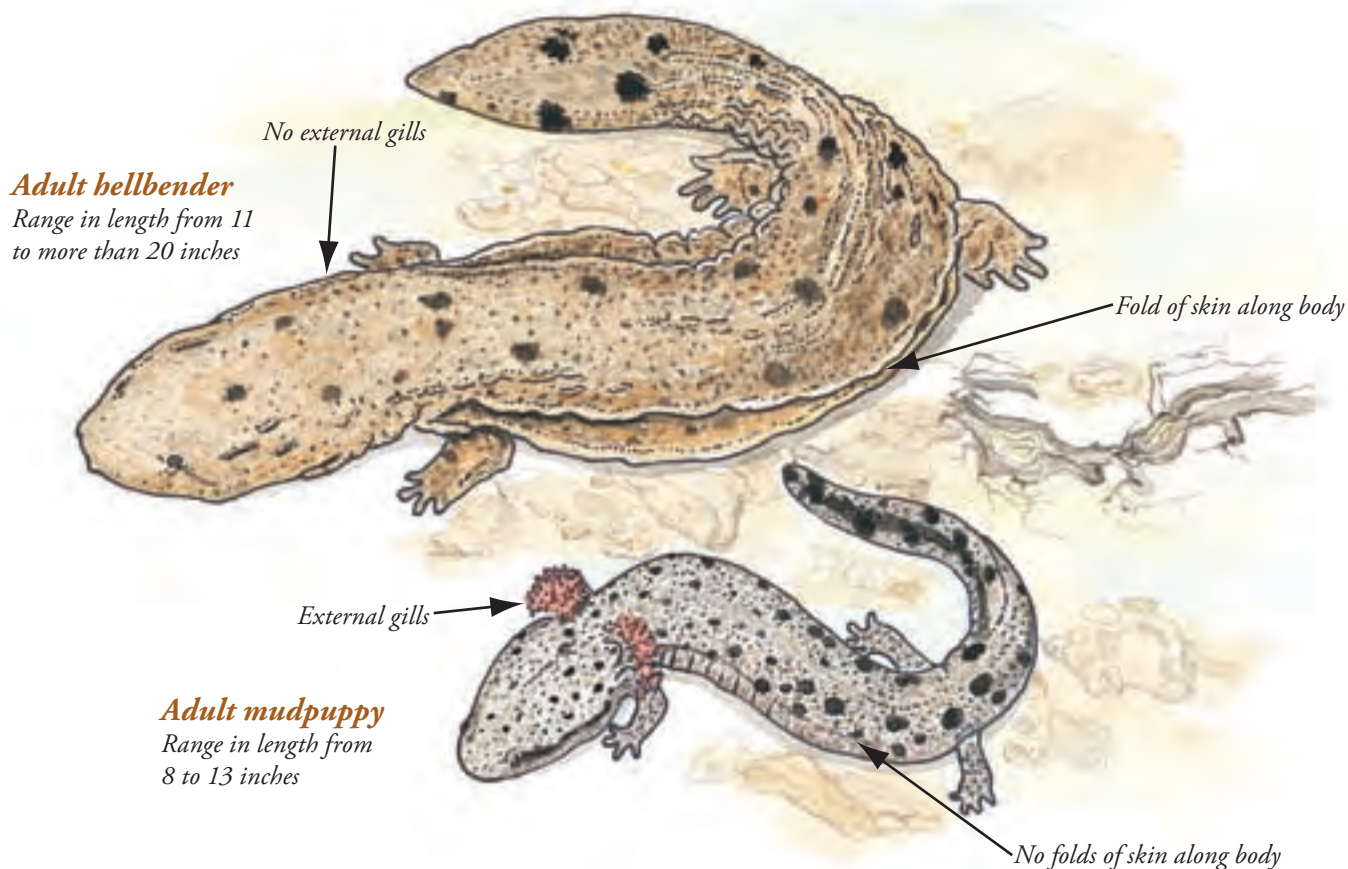
Mudpuppy or Hellbender—What's the Difference?

Another aquatic salamander, the mudpuppy (*Necturus maculosus*), also is found in the Ozarks and often is misidentified as a hellbender. Although they are similar in shape, adult mudpuppies are much smaller, ranging in length from 8 to 13 inches, while adult hellbenders

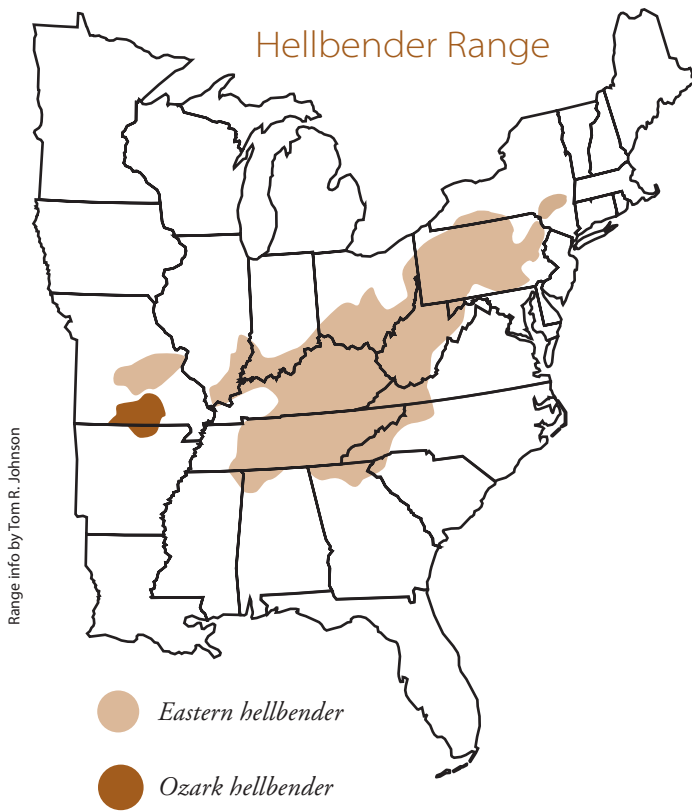
can be more than 20 inches. Also, hellbenders have folds of skin along their body, while mudpuppies do not. Misidentification often occurs when people see a hellbender less than 2 years old that still has its gills. See photo 3 on page 2. Unlike hellbenders, mudpuppies have external gills throughout their lives.



Tom R. Johnson photos



Tom R. Johnson illustration



Habitat and Home Range

Spring-fed rivers and streams are where hellbenders live, but they must have certain requirements to survive. Specifically, hellbenders live in cool, clear, unpolluted rivers with moderate to fast current and places to hide. The Ozark streams of Missouri and Arkansas provide ideal conditions for hellbenders. These waterways have rocky riffles that help oxygenate the water, and large flat rocks or bedrock with openings in shallow water for hellbenders to use for shelter. Keeping these rivers and streams protected from pollution, excessive siltation and degradation is the key for hellbender survival.

Hellbender Facts

It only takes a few people who have seen or caught hellbenders on a baited hook and line to generate a number of questions and erroneous myths.

Questions:

What good are they, anyway?

As with all wildlife native to our area, hellbenders need to be protected and their survival needs to be ensured because they are a part of the overall health of the natural, aquatic environment. Because they primarily eat crayfish, they likely



have a major role in maintaining crayfish populations to keep them in balance with other aquatic animals. Hellbenders have been in North America for more than 6 million years, and keeping these unique amphibians a part of our wildlife heritage helps maintain biodiversity. Finally, hellbenders are a major indicator of the overall health of a river or stream; and if there is something in the water that is causing their decline, it can affect us as well.

Are hellbenders common in the Ozarks?

In the Ozark streams where they are known to occur, these animals probably were quite common prior to European settlement. But, in the past 10 years, a marked decline in their population has been recorded.

Do they make good pets?

No, hellbenders require cool, clean running water, lots of room and live crayfish to eat. These animals are protected in Missouri and Arkansas, and none can legally be taken from the wild for any use.

Are they called by any other names?

In Missouri and Arkansas some people may call them water dogs, mud devils, mountain alligators and walking catfish.

Hellbenders need cool, clear, unpolluted waterways with large rocks and riffles to live, such as the Big Piney River (far left) and the Jacks Fork River (bottom). In such waterways, hellbenders seek both shelter and their main food source, crayfish (below).



Tom R. Johnson

Jim Rathert



Myths:

Hellbenders are so large, ugly and slimy; they must be poisonous.

☐ True ☒ FALSE

Although they may snap at a hand when someone tries to hold one, hellbenders are not venomous or poisonous.

Because they live on the bottom of rivers, they eat eggs of bass and other game fish.

☐ True ☒ FALSE

There have been several studies of hellbender diets in Missouri and other states. More than 90 percent of their food consists of crayfish or small fish. No fish eggs have ever been found in the stomach of a hellbender.

These ugly brown things can shock you like an electric eel.

☐ True ☒ FALSE

No electric current has ever been detected from a live hellbender in the wild or in the laboratory.

Cattle in streams can influence water quality, which can affect all aquatic life. River erosion and siltation covers up the rocks hellbenders need for shelter and finding food.



Jeff Briggler

Jim Rathert

What is Happening to Missouri Hellbenders?

Extensive data on hellbender populations, age structure and body size of Ozark and eastern hellbenders in Missouri were collected in the 1970s, 1980s and 1990s. These studies showed that hellbender populations have declined by an average of 77 percent with a strong shift in age structure to larger and older adults. An obvious lack of young in the populations studied during the 1990s indicates either a lack of successful reproduction or an increase in young hellbender mortality. This is especially alarming for a species that lives several decades, much longer than other aquatic animals.

In most of the 16 states where they are found, hellbenders are listed as rare, threatened or endangered. Due to obvious population declines of both Ozark and eastern hellbenders, the Missouri Department of Conservation has listed hellbenders as state endangered. Currently, the Ozark hellbender is a federal candidate for listing under the Endangered Species Act.

Most long-living aquatic wildlife that require clean, clear and cool rivers for their survival also need a stable habitat. Potential threats include poor water quality and toxic chemical contamination of rivers that may cause reproductive problems such as sperm production and viability, fertilization, egg development and hatching success. Other habitat alterations that may directly affect hellbenders include in-stream gravel mining, the removal of large, flat rocks from stream beds and free access of rivers by cattle, which greatly increases river siltation and nutrification. The indiscriminate killing of hellbenders by anglers, giggers and other river users has likely contributed to the decline of hellbenders, as well as the illegal taking of live hellbenders for the pet trade. With a drastically reduced population and fewer young, hellbenders could become extinct in less than 20 years in parts of their range, which includes Missouri and Arkansas.

Within the last few years, researchers have found a number of specimens with minor to severe deformities, usually in the form of lost or fused toes or missing limbs. In addition, specimens have been found with missing eyes, open lesions and external tumors. These conditions have been found in other amphibian populations in the North America, and studies are underway to document the types of deformities and possible causes.

How Can Hellbenders Be Helped?

Considerable effort is being taken to investigate the decline of hellbenders in the Missouri and Arkansas Ozarks. A team of biologists with several universities, public zoos and fish

hatcheries, along with herpetologists and state and federal agency representatives, have formed the Ozark Hellbender Working Group. Some of the group's goals are:

- To investigate water quality and the effects of water contamination on hellbender breeding success.
- To examine deformed specimens to see if a disease or parasites are to blame for limb abnormalities.
- To look into the possibility of captive breeding of hellbenders as a means to protect the species' long-term survival. To date, hellbenders have never been successfully bred in captivity, although larvae have been hatched from eggs taken from the wild and reared in a laboratory. Future studies will examine whether these young hellbenders will live to breeding age and size, and if they can be successfully re-introduced to their natural habitat in the wild.
- To continue to monitor hellbender population trends and determine if conservation efforts are helping hellbender populations recover.
- To increase public awareness and appreciation of hellbenders, the ecosystems they require, and the conservation efforts needed to maintain this species.

How You Can Help

People who frequent Ozark streams for recreation can help hellbenders recover in Missouri and Arkansas by:

- In Missouri, report hellbender sightings by calling Jeff Briggler, herpetologist with the Missouri Department of Conservation at 573/522-4115, ext. 3201, or e-mail jeff.briggler@mdc.mo.gov.
- In Arkansas, report hellbender sightings by calling Kelly Irwin, herpetologist with the Arkansas Game & Fish Commission at 877/847-2690, ext. 16, or e-mail kirwin@agfc.state.ar.us.
- Report illegal collecting of hellbenders. Hellbenders are a protected species in Missouri and Arkansas, and are not allowed to be taken from the wild for any reason. In Missouri you can call toll-free 800/392-1111 to report illegal activities. To report illegal collecting of hellbenders in Arkansas, contact the herpetologist listed above.
- If you catch a hellbender while fishing, simply cut the line near the head and release it back into the river. The hook will rust away in a matter of weeks.
- Giggers in Ozark streams can play an important role in the conservation of hellbenders. Because of the nocturnal nature of their sport, giggers may see more hellbenders than anyone else using the river. If you gig, keep track of the numbers of

Biologists have recently found hellbenders with deformities, such as toes being fused together (top). Giggers can provide biologists with a great deal of information on hellbender sightings while gigging for fish. It is illegal to gig for hellbenders.



Jeff Briggler



Cliff White

hellbenders seen on a gigging outing, note the locations and contact the biologists listed above. Also, help spread the word that gigging hellbenders is not only senseless, it also is illegal.

- Help keep local rivers and streams clean and natural. Join a local Stream Team, a volunteer organization that brings young and old together to clean, care for and monitor river systems of all sizes. For more information on Stream Team activities in Missouri, go to: www.mostreamteam.org.
- Landowners who allow cattle free access to Ozark streams for drinking can greatly improve water quality by fencing riparian zones to exclude cattle. The Missouri Department of Conservation, in partnership with the Natural Resource Conservation Service, has stream-bank stabilization information and programs to assist landowners who want to keep cattle from damaging streams and rivers.
- The many thousands of canoeists and anglers who visit our Ozark streams need to keep these waterways clean and pristine by leaving no waste behind. This includes, when possible, moving away from a stream at least 100 feet before urinating or defecating.
- Protect hellbender habitat from disturbance. Because hellbenders are dependent on large flat rocks in the stream bed for shelter, these rocks need to be left in place.
- Report in-stream gravel mining from Ozark streams.
- Keep pollutants out of the entire watershed that eventually enters into Ozark streams.

Can We Ensure Hellbender Survival?

With the cooperation of various agencies, universities, zoos, fish hatcheries, landowners, concerned citizens and volunteers, we may be able to turn the tide for these long-lived, unusual amphibians. Keeping a healthy population of hellbenders will indicate that our beautiful, free-flowing Ozark streams are clear, clean and being preserved for future generations of people and hellbenders.

Hellbender Conservation Team Members



Fencing off sections of river to exclude livestock can improve water quality, and planting trees will further stabilize stream banks (top). Clear, clean waterways such as the North Fork River are ideal habitat for hellbenders (middle). Joining a Stream Team allows people to be a part of keeping a waterway clean, and thus, improve habitat for hellbenders and other native wildlife (bottom).



Cliff White



Tom R. Johnson



Cliff White